

In re Patent Application of
STORM ET AL.
Serial No. 10/820,463
Filed: APRIL 8, 2004

Listing of the Claims:

This listing of claims replaces all prior versions and listing of claims in the application.

Claims 1-10 (Cancelled).

11. (Previously presented) An image sensor comprising:
an array of pixels, each pixel comprising
a photodiode,
a semiconductor device having a capacitance and being connected to said photodiode and operating based upon a sub-threshold for providing a signal that is proportional to a logarithm of light intensity on said photodiode, and
a calibration circuit having a capacitance and for applying a voltage having a constant rate of change across the capacitance associated with said semiconductor device and said calibration circuit for producing a constant current within said pixel.

12. (Previously presented) An image sensor according to Claim 11, wherein each pixel further comprises a switching device between said photodiode and said semiconductor device, said switching device being operable during calibration for isolating said photodiode from said semiconductor device.

13. (Previously presented) An image sensor according to Claim 12, wherein said calibration circuit comprises an amplifier having an inverting input for receiving the signal from said semiconductor device, a non-inverting input for receiving a reference voltage, and an output for providing a pixel output signal.

14. (Previously presented) An image sensor according to Claim 13, wherein the reference voltage comprises a ramp voltage for providing the voltage having the constant rate of change.

15. (Previously presented) An image sensor according to Claim 14, wherein the ramp voltage is also applied at a beginning of an image-capturing operation of said pixel.

16. (Previously presented) An image sensor according to Claim 13, further comprising a feedback loop between the output of said amplifier and said semiconductor device, the feedback loop for controlling said semiconductor device.

17. (Previously presented) An image sensor according to Claim 13, wherein each pixel has an image area associated therewith, and said amplifier for each respective pixel is completely within the corresponding image area.

18. (Previously presented) An image sensor according to Claim 13, wherein each pixel has an image area associated therewith, and wherein said amplifier for each respective pixel is partly within the corresponding image area.

19. (Previously presented) An image sensor according to Claim 13, wherein said semiconductor device comprises a transistor comprising a conducting terminal, and wherein the capacitance is provided by a capacitance of the conducting terminal and a capacitance of the inverting input of said amplifier.

20. (Previously presented) An image sensor comprising:

- an array of pixels, each pixel comprising
 - a photodiode;
 - a semiconductor device having a capacitance and being connected to said photodiode;
- and

- a calibration circuit having a capacitance and for applying a voltage across the capacitance associated with said semiconductor device and said calibration circuit for producing a constant current within said pixel.

21. (Previously presented) An image sensor according to Claim 20, wherein the image sensor is operating in a logarithmic mode.

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22. (Previously presented) An image sensor according to Claim 20, wherein each pixel further comprises a switching device between said photodiode and said semiconductor device, said switching device being operable during calibration for isolating said photodiode from said semiconductor device.

23. (Previously presented) An image sensor according to Claim 20, wherein said calibration circuit comprises an amplifier having an inverting input for receiving the signal from said semiconductor device, a non-inverting input for receiving a reference voltage, and an output for providing a pixel output signal.

24. (Previously presented) An image sensor according to Claim 23, wherein the reference voltage comprises a ramp voltage for providing the voltage having the constant rate of change.

25. (Previously presented) An image sensor according to Claim 24, wherein the ramp voltage is also applied at a beginning of an image-capturing operation of said pixel.

26. (Previously presented) An image sensor according to Claim 23, further comprising a feedback loop between the output of said amplifier and said semiconductor

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device, the feedback loop for controlling said semiconductor device.

27. (Previously presented) An image sensor according to Claim 23, wherein each pixel has an image area associated therewith, and said amplifier for each respective pixel is completely within the corresponding image area.

28. (Previously presented) An image sensor according to Claim 23, wherein each pixel has an image area associated therewith, and wherein said amplifier for each respective pixel is partly within the corresponding image area.

29. (Previously presented) An image sensor according to Claim 23, wherein said semiconductor device comprises a transistor comprising a conducting terminal, and wherein the capacitance is provided by a capacitance of the conducting terminal and a capacitance of the inverting input of said amplifier.

30. (Previously presented) A method for calibrating an image sensor operating in a logarithmic mode, the image sensor comprising an array of pixels, each pixel comprising a photodiode, a semiconductor device having a capacitance and connected to the photodiode, and a calibration circuit having a capacitance and being connected to the semiconductor device, the method comprising:

applying a voltage having a constant rate of change across the capacitance associated with the semiconductor device and the calibration circuit for producing a constant current within the pixel during calibration.

31. (Previously presented) A method according to Claim 30, wherein each pixel further comprises a switching device between the photodiode and the semiconductor device; the method further comprising operating the switching device during calibration for isolating the photodiode from the semiconductor device.

32. (Previously presented) A method according to Claim 31, wherein the semiconductor device operates based upon a sub-threshold for providing a signal that is proportional to a logarithm of light intensity on the photodiode, and the calibration circuit comprises an amplifier having an inverting input for receiving the signal from the semiconductor device, a non-inverting input for receiving a reference voltage, and an output of the amplifier provides a pixel output signal.

33. (Previously presented) A method according to Claim 32, wherein the reference voltage comprises a ramp voltage for providing the voltage having the constant rate of change.

34. (Previously presented) A method according to Claim 33, wherein the ramp voltage is also applied as the

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reference voltage at a beginning of an image-capturing operation of the pixel.

35. (Previously presented) A method according to Claim 32, wherein each pixel further comprises a feedback loop between the output of the amplifier and the semiconductor device, the feedback loop for controlling the semiconductor device.

36. (Previously presented) A method according to Claim 32, wherein each pixel has an image area associated therewith, and wherein the amplifier for each respective pixel is contained completely within the corresponding image area.

37. (Previously presented) A method according to Claim 32, wherein each pixel has an image area associated therewith, and wherein the amplifier for each respective pixel is partly within the corresponding image area.

38. (Previously presented) A method according to Claim 32, wherein the semiconductor device comprises a transistor comprising a conducting terminal, and wherein the capacitance is provided by a capacitance of the conducting terminal and a capacitance of the inverting input of the amplifier.